

ABSTRACT OF THE DISCLOSURE

A method of fabricating BEOL interconnect structures on a
5 semiconductor device having a plurality of via contacts with low via contact
resistance is provided. The method includes the steps of: a) forming a
porous or dense low k dielectric layer on a substrate; b) forming single or
dual damascene etched openings in the low k dielectric; c) placing the
substrate in a process chamber on a cold chuck at a temperature about -
10 200 °C to about 25 °C; d) adding to the process chamber a condensable
cleaning agent (CCA) to condense a layer of CCA within the etched
openings on the substrate; and e) performing an activation step while the
wafer remains cold at a temperature of about -200 °C to about 25 °C. The
via contacts are very stable during thermal cycles and during operation of
15 the semiconductor device.